OUTPUT AIRLINES

Summary statistics of airline data set

```
> print(summary(airline))
    AIRLINE          AIRCRAFT       FLIGHT_DURATION       MONTH        INTERNATIONAL      SEATS_ECONOMY
 Min.   :1.000    Min.   :0.0000   Min.   : 1.250    Min.   :0.000   Min.   :0.0000    Min.   : 17.0
 1st Qu.:2.000    1st Qu.:0.0000   1st Qu.: 4.250    1st Qu.:1.000   1st Qu.:1.0000    1st Qu.:127.0
 Median :2.000    Median :0.0000   Median : 7.750    Median :2.000   Median :1.0000    Median :185.0
 Mean   :3.017    Mean   :0.3268   Mean   : 7.549    Mean   :1.671   Mean   :0.9134    Mean   :200.7
 3rd Qu.:4.000    3rd Qu.:0.0000   3rd Qu.:10.500    3rd Qu.:3.000   3rd Qu.:1.0000    3rd Qu.:243.0
 Max.   :6.000    Max.   :1.0000   Max.   :14.660    Max.   :3.000   Max.   :1.0000    Max.   :389.0
  SEATS_PREMIUM    PITCH_ECONOMY    PITCH_PREMIUM     WIDTH_ECONOMY   WIDTH_PREMIUM     PRICE_ECONOMY
 Min.   : 8.00    Min.   :30.00    Min.   :34.00     Min.   :17.00   Min.   :17.00     Min.   : 65.0
 1st Qu.:21.00    1st Qu.:31.00    1st Qu.:38.00     1st Qu.:17.00   1st Qu.:19.00     1st Qu.: 404.8
 Median :36.00    Median :31.00    Median :38.00     Median :18.00   Median :19.00     Median :1224.0
 Mean   :33.54    Mean   :31.21    Mean   :37.92     Mean   :17.83   Mean   :19.48     Mean   :1317.1
 3rd Qu.:40.00    3rd Qu.:32.00    3rd Qu.:38.00     3rd Qu.:18.00   3rd Qu.:21.00     3rd Qu.:1903.0
 Max.   :66.00    Max.   :33.00    Max.   :40.00     Max.   :19.00   Max.   :21.00     Max.   :3593.0
  PRICE_PREMIUM    PRICE_RELATIVE         N              LAMBDA          DiffPITCH
 Min.   :  86     Min.   :0.0200   Min.   : 38.0     Min.   :0.0500   Min.   : 2.000
 1st Qu.: 524     1st Qu.:0.1000   1st Qu.:162.0     1st Qu.:0.1200   1st Qu.: 6.000
 Median :1710     Median :0.3800   Median :227.0     Median :0.1300   Median : 7.000
 Mean   :1832     Mean   :0.4926   Mean   :234.2     Mean   :0.1503   Mean   : 6.716
 3rd Qu.:2989     3rd Qu.:0.7475   3rd Qu.:279.0     3rd Qu.:0.1500   3rd Qu.: 7.000
 Max.   :7414     Max.   :1.8900   Max.   :441.0     Max.   :0.5500   Max.   :10.000
   diffPRICE         diffPITCH         diffWIDTH
 Min.   :  13.96  Min.   : 2.000   Min.   :0.000
 1st Qu.: 104.40  1st Qu.: 6.000   1st Qu.:1.000
 Median : 264.68  Median : 7.000   Median :1.000
 Mean   : 515.44  Mean   : 6.716   Mean   :1.654
 3rd Qu.: 752.73  3rd Qu.: 7.000   3rd Qu.:3.000
 Max.   :4311.78  Max.   :10.000   Max.   :4.000
> |
```
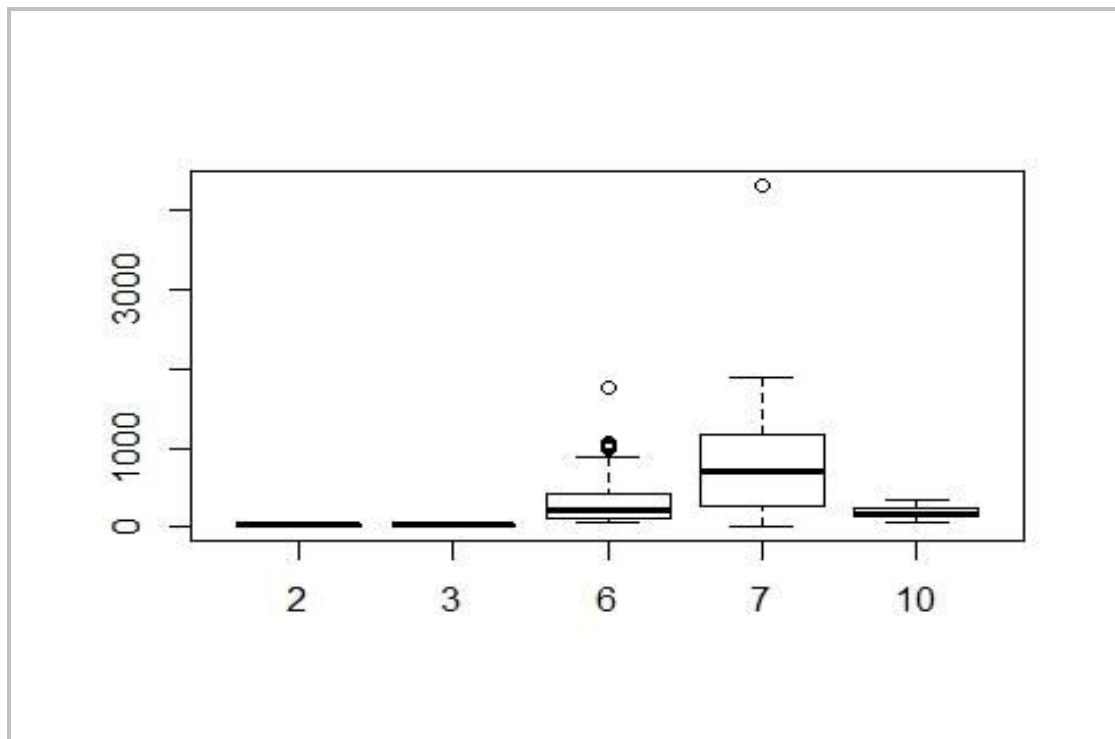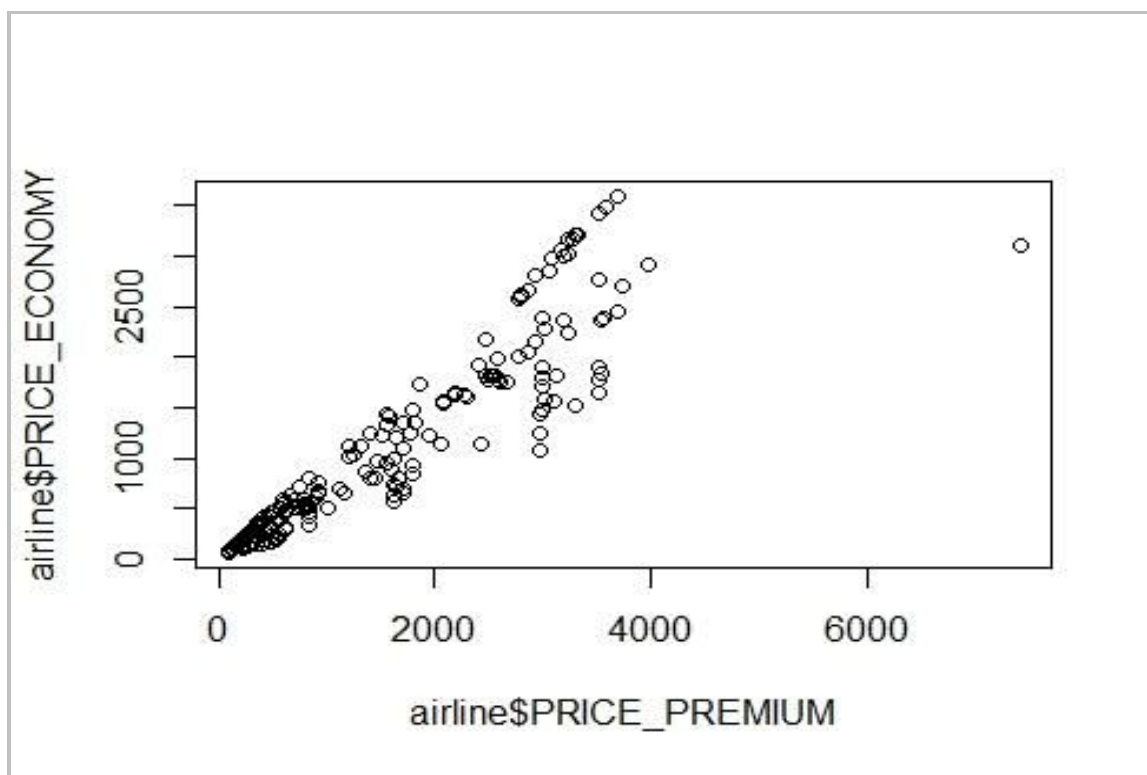
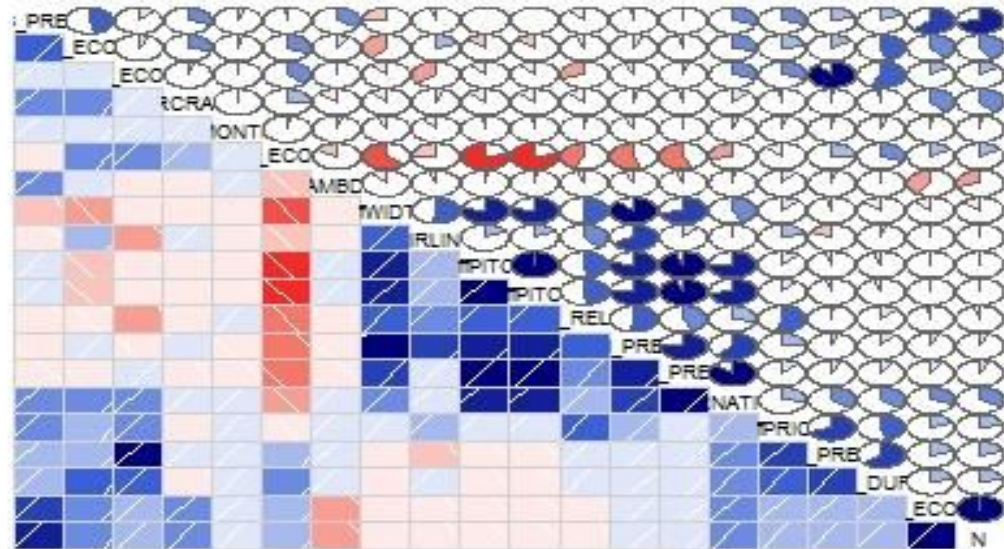## Boxplot of diffPRICE and diffPITCH

Scatterplot of PRICE_PREMIUM and PRICE_ECONOMY

Corrgram of airline intercorrelation

Correlation matrix of airline

```
> cor(airline)
```

	AIRLINE	AIRCRAFT	FLIGHT_DURATION	MONTH	INTERNATIONAL	SEATS_ECONOMY	SEATS_PREMIUM
AIRLINE	1.000000000	0.045896698	0.023606739	-0.086746663	0.003236071	-0.005410076	-0.0328743069
AIRCRAFT	0.045896698	1.000000000	-0.022265599	0.007377185	0.116071917	0.401466912	0.2953905141
FLIGHT_DURATION	0.023606739	-0.022265599	1.000000000	0.042726734	0.370272495	0.209301905	0.1677076365
MONTH	-0.086746663	0.007377185	0.042726734	1.000000000	0.042781237	0.013665959	0.0542864791
INTERNATIONAL	0.003236071	0.116071917	0.370272495	0.042781237	1.000000000	0.307805993	0.3089800311
SEATS_ECONOMY	-0.005410076	0.401466912	0.209301905	0.013665959	0.307805993	1.000000000	0.6267956084
SEATS_PREMIUM	-0.032874307	0.295390514	0.167707636	0.054286479	0.308980031	0.626795608	1.0000000000
PITCH_ECONOMY	-0.239726163	0.241596266	0.303239275	0.020511825	-0.287339041	0.176145581	-0.0184742879
PITCH_PREMIUM	0.115967143	-0.040380485	0.082007777	-0.008600321	0.862077210	0.082656260	-0.0081832073
WIDTH_ECONOMY	0.204979458	0.292529863	0.462436824	0.034357832	0.292076303	0.391536716	0.4618817295
WIDTH_PREMIUM	0.673579363	0.036853395	0.090968063	-0.066095472	0.611303953	0.070712269	-0.0140721606
PRICE_ECONOMY	-0.348446625	0.037272760	0.570604184	0.002979302	0.299064115	0.148163761	0.1221179841
PRICE_PREMIUM	-0.174317647	0.020092754	0.651891797	0.018930560	0.345594440	0.195287760	0.2249974040
PRICE_RELATIVE	0.391409506	-0.119890981	0.108224710	0.019989106	0.277467290	-0.024509143	-0.1072356234
N	-0.009869921	0.405295313	0.213389202	0.020544571	0.323328584	0.992908806	0.7149790849
LAMBDA	-0.052313524	-0.128565543	0.003494719	0.038527062	0.018121358	-0.399068794	0.3163713970
diffPRICE	0.205753315	-0.019484740	0.474210224	0.036688085	0.257386100	0.180881213	0.2907631811
diffPITCH	0.175251996	-0.119809583	-0.051829983	-0.014013167	0.747083851	-0.004098189	0.0007906561
diffWIDTH	0.520721037	-0.102441418	-0.132021926	-0.076448680	0.423220417	-0.117551111	-0.2278440100

	PITCH_ECONOMY	PITCH_PREMIUM	WIDTH_ECONOMY	WIDTH_PREMIUM	PRICE_ECONOMY	PRICE_PREMIUM	PRICE_RELATIVE
AIRLINE	-0.23972616	0.115967143	0.20497946	0.67357936	-0.348446625	-0.17431765	0.39140951
AIRCRAFT	0.24159627	-0.040380485	0.29252986	0.03685339	0.037272760	0.02009275	-0.11989098
FLIGHT_DURATION	0.30323927	0.082007777	0.46243682	0.09096806	0.570604184	0.65189180	0.10822471
MONTH	0.02051183	-0.008600321	0.03435783	-0.06609547	0.002979302	0.01893056	0.01998911
INTERNATIONAL	-0.28733904	0.862077210	0.29207630	0.61130395	0.299064115	0.34559444	0.27746729
SEATS_ECONOMY	0.17614558	0.082656260	0.39153672	0.07071227	0.148163761	0.19528776	-0.02450914
SEATS_PREMIUM	-0.01847429	-0.008183207	0.46188173	-0.01407216	0.122117984	0.22499740	-0.10723562
PITCH_ECONOMY	1.00000000	-0.561708319	0.31103746	-0.54892493	0.379604972	0.23983878	-0.43465185
PITCH_PREMIUM	-0.56170832	1.000000000	-0.04362734	0.75485187	0.033635434	0.07133125	0.42782361
WIDTH_ECONOMY	0.31103746	-0.043627342	1.00000000	0.06259988	0.081967901	0.16310757	-0.06093642
WIDTH_PREMIUM	-0.54892493	0.754851871	0.06259988	1.00000000	-0.070180135	0.04932498	0.51167702
PRICE_ECONOMY	0.37960497	0.033635434	0.08196790	-0.07018013	1.000000000	0.90253105	-0.29810431
PRICE_PREMIUM	0.23983878	0.071331248	0.16310757	0.04932498	0.902531053	1.00000000	0.01757342
PRICE_RELATIVE	-0.43465185	0.427823608	-0.06093642	0.51167702	-0.298104314	0.01757342	1.00000000
N	0.15523329	0.072917300	0.42178638	0.06130173	0.151575655	0.20955518	-0.03835229
LAMBDA	-0.17266314	-0.053841073	0.09724877	-0.07203714	-0.005672849	0.03550282	-0.05005721

T test between diffPITCH and diffWIDTH

```
t.test(airline$diffPITCH, airline$diffWIDTH)
        Welch Two Sample t-test

data:  airline$diffPITCH and airline$diffWIDTH
t = 50.62, df = 809.74, p-value < 2.2e-16
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 4.866452 5.259089
sample estimates:
mean of x mean of y
  6.71645   1.65368
```

Regression model Final (outcome varible- diffPRICE)

```
Call:
lm(formula = diffPRICE ~ FLIGHT_DURATION + INTERNATIONAL + diffWIDTH
+
    diffPITCH + LAMBDA, data = airline)

Residuals:
   Min     1Q Median     3Q    Max
-839.7 -281.4  -58.1  128.9 3370.9

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     -412.772    131.378  -3.142  0.00179 **
FLIGHT_DURATION   83.461      8.435   9.894  < 2e-16 ***
INTERNATIONAL    -52.195    169.117  -0.309  0.75774
diffWIDTH         85.262     33.388   2.554  0.01098 *
diffPITCH          7.889     33.803   0.233  0.81556
LAMBDA          1010.042    391.517   2.580  0.01020 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 501.6 on 456 degrees of freedom
Multiple R-squared:  0.2651,   Adjusted R-squared:  0.257
F-statistic:  32.9 on 5 and 456 DF,  p-value: < 2.2e-16
```

Regression model Final (outcome varible- diffPRICE) removing explanatory variables whose beta-coefficients are not statistically significant

```
summary(model2A)
Call:
lm(formula = diffPRICE ~ FLIGHT_DURATION + diffWIDTH + LAMBDA,
    data = airline)

Residuals:
   Min     1Q Median     3Q    Max
-836.2 -288.1  -53.6  129.9 3381.1

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
```

```
(Intercept)       -402.025       91.405  -4.398 1.36e-05 ***
FLIGHT_DURATION     81.863        6.644  12.322  < 2e-16 ***
diffWIDTH           88.490       19.652   4.503 8.52e-06 ***
LAMBDA            1018.636      383.537   2.656  0.00819 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 500.5 on 458 degrees of freedom
Multiple R-squared:  0.2649,   Adjusted R-squared:  0.2601
F-statistic: 55.03 on 3 and 458 DF,  p-value: < 2.2e-16
```

Anova table of previous two models

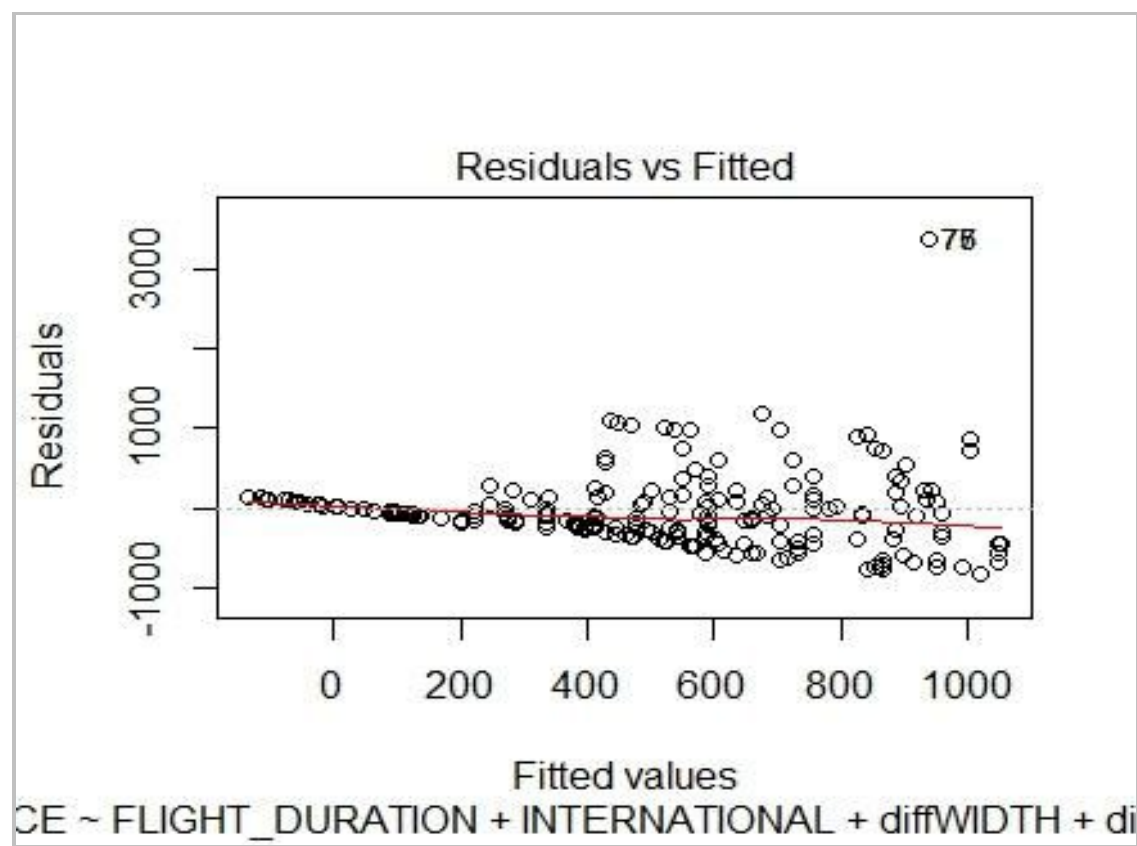```
Analysis of Variance Table

Model 1: diffPRICE ~ FLIGHT_DURATION + INTERNATIONAL + diffWIDTH +
diffPITCH +
    LAMBDA
Model 2: diffPRICE ~ FLIGHT_DURATION + diffWIDTH + LAMBDA
  Res.Df   RSS Df Sum of Sq   F Pr(>F)
1   456 114725203
2   458 114749225 -2   -24023 0.0477 0.9534
```

## Residual versus fitted model plot (without removing any variable)

## 95 % confidence intervals of fitted variables

```
confint(model2)                         2.5 %      97.5 %
(Intercept)       -670.95222 -154.59086
FLIGHT_DURATION     66.88351  100.03806
INTERNATIONAL     -384.54057  280.14977
diffWIDTH           19.64805  150.87557
diffPITCH          -58.53973   74.31853
LAMBDA             240.64172 1779.44319


confint(model2A)                        2.5 %      97.5 %
(Intercept)       -581.65035 -222.39938
FLIGHT_DURATION     68.80652   94.91877
diffWIDTH           49.87066  127.10902
LAMBDA             264.92561 1772.34685
```